SitePlayer™
TELNET

RS232 to Ethernet Protocol Converter
User's Manual

NetMedia®

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# Conventions

Certain conventions are used throughout this reference document:

- The term Siteplayer and SitePlayer Telnet is used interchangeably.
- Web screen shots may not appear exactly the same between various web browsers and operating systems.

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# Specifications

Some of SitePlayer Telnet's features include

- Compact size
- RJ45 10BaseT Ethernet interface
- Binary data transfer using TCP/IP
- Binary data transfer using UDP
- Full configurable RS232 DB-9 serial port
    - Baud rate selection from 50 to 115000 baud
    - Parity selection Odd, Even or none
    - Flow control selection RTS/CTS, XON/XOFF or none
    - Data bit selection 7 or 8 bit
    - Control signals available RTS, CTS, DTR, DSR, DCD and RI
- Device configured via a web browser. Web browser can be password protected
- Flash ROM software updates can be uploaded to device using web browser
- Can be configured as a Server or Client
- Conforms to various internet standards:
    - ARP
    - TCP/IP
    - UDP
    - DHCP
    - Link Local / Rendezvous
    - ICMP Ping
    - HTTP
    - Daytime protocol
    - Discard protocol
- TCP/IP or UDP ports may be protected using source IP and mask
- Up to 4 IP addresses configurable
    - DHCP
    - Link Local
    - 2 static IP addresses
- Single LED indicates online status
- External 110VAC to 7.5VDC power adapter included
- Input power requirements 7.5VDC at 150ma
- Dimensions (HxWxD) 0.95 x 2.2 x 2.69 in (2.4 x 5.6 x 6.8 cm)
- FCC Class ?

# Introduction

SitePlayer Telnet is an RS232 to Ethernet protocol converter. It allows you to connect legacy RS232 devices to the internet by providing a TCP/IP telnet session to an RS232 port. SitePlayer Telnet is configured using a standard web browser. A variety of parameters may be configured for both the serial port and the internet connection.

With SitePlayer Telnet you will be able to make an RS232 serial device accessible from any where there is an internet connection. You will no longer be restricted by wiring limitations. If you have access to the internet, you will be able to also access SitePlayer. There are many devices which can only be controlled via RS232. With SitePlayer you can now control these devices through the internet. You can also use two SitePlayer Telnet devices to create an internet bridge between two serial devices.

This document describes the SitePlayer Telnet product which comes completely assembled including SitePlayer Module, Telnet carrier board and case. If you have purchased just the SitePlayer Module, you will find a schematic in Appendix B of the Telnet carrier board which will help illustrate how to connect the SitePlayer module to external devices.

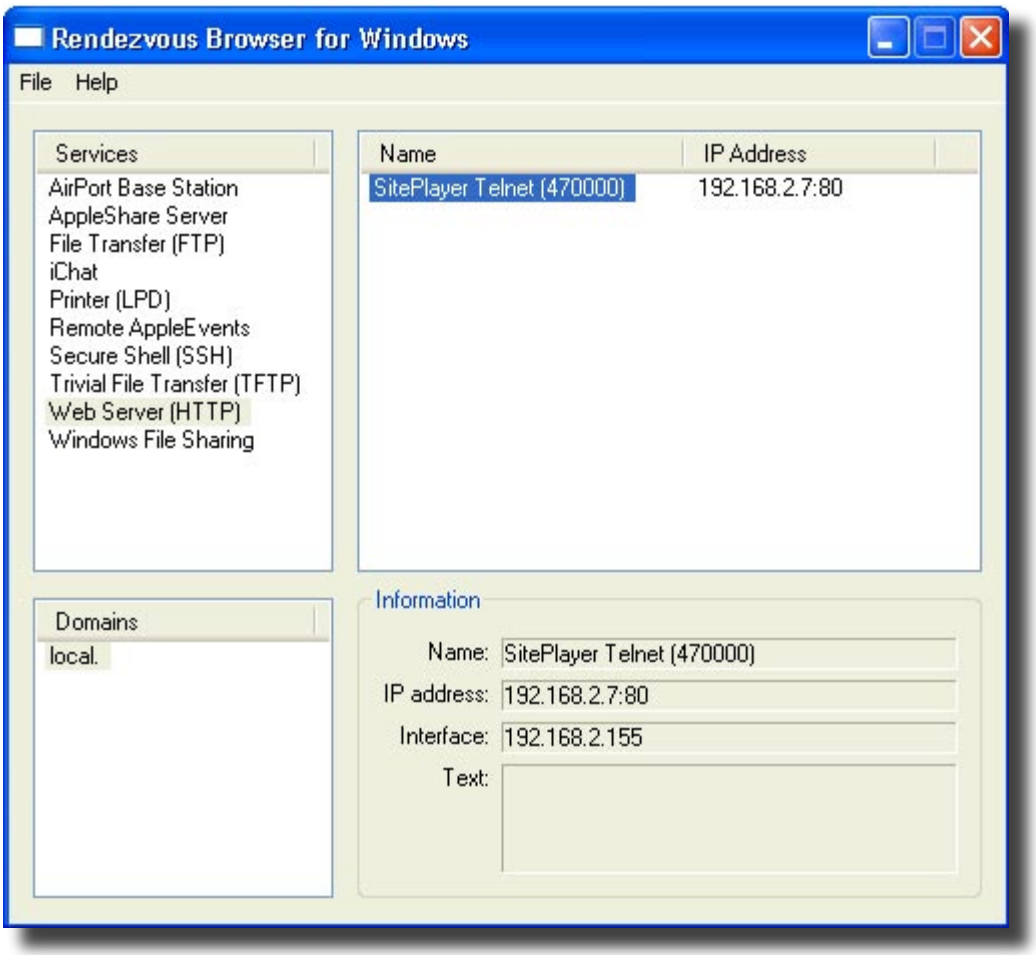
# Configuration and Setup

SitePlayer Telnet uses Link Local and multicast DNS (also known as Rendezvous) to advertise its presence on the network. You can use a Rendezvous browser to locate SitePlayer Telnet and then use a standard web browser to configure SitePlayer. Some web browsers, such as Apple's Safari, have a built in Rendezvous browser. Other web browsers, such as Internet Explorer, can have a Rendezvous plug-in installed for them. For Windows users the easiest thing to do is download the "Rendezvous Browser.exe" file from the NetMedia web site at

http://www.SitePlayer.com/telnet/

See Appendix A for more Rendezvous browser options.

Once you run Rendezvous Browser you will see a window similar to the following




Each SitePlayer Telnet has a unique name associated with it which you can change later on. The factory default name is in the form SitePlayer Telnet (XXXXXX), where XXXXXX are the last 3 digits of the SitePlayer's MAC address in hex. Double clicking on the Name will run your web browser and attempt to connect to the SitePlayer Telnet Setup web page.

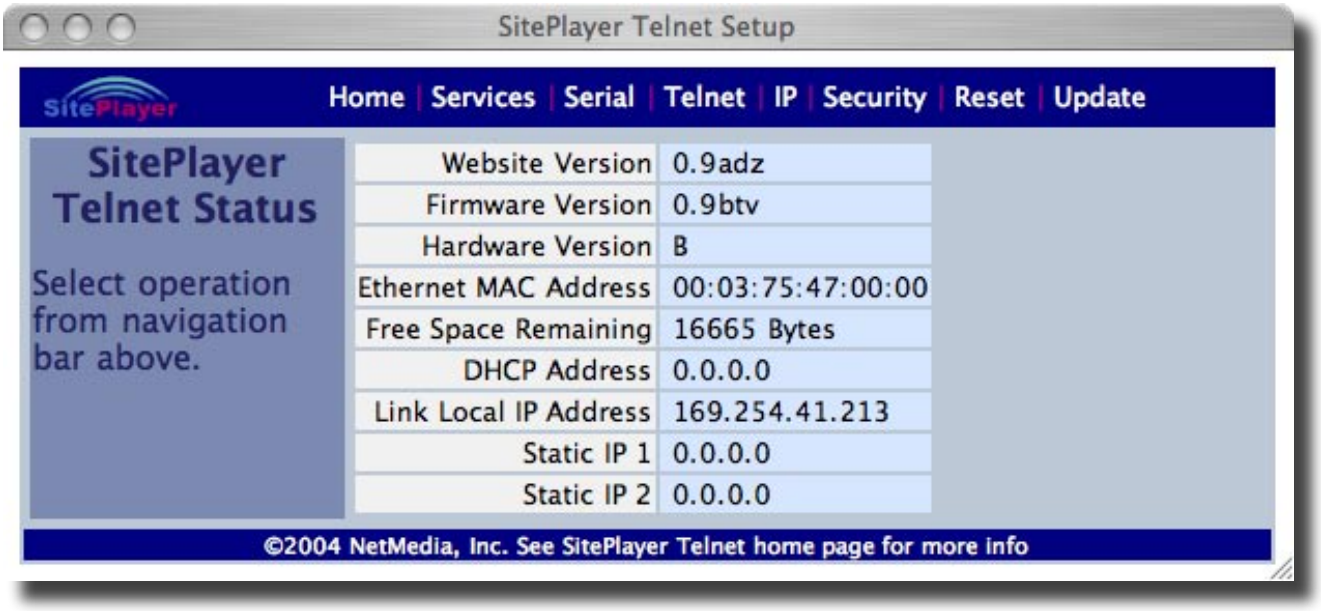
When your browser connects to SitePlayer, you will be greeted with an authentication window requesting your username and password.

The factory default username is **user** and the factory default password is **password**. Usernames and passwords are case sensitive. You will have an opportunity later on to change these if you wish.

Once you type the username and password you will see the main SitePlayer Telnet Setup page.

The following sections describe the main SitePlayer Telnet Setup page and the other web pages which are used to configure SitePlayer.

# SitePlayer Telnet Setup Web Page


SitePlayer Telnet Setup
SitePlayer
Home | Services | Serial | Telnet | IP | Security | Reset | Update
SitePlayer Telnet Status
Select operation from navigation bar above.
Website Version 0.9adz
Firmware Version 0.9btv
Hardware Version B
Ethernet MAC Address 00:03:75:47:00:00
Free Space Remaining 16665 Bytes
DHCP Address 0.0.0.0
Link Local IP Address 169.254.41.213
Static IP 1 0.0.0.0
Static IP 2 0.0.0.0
©2004 NetMedia, Inc. See SitePlayer Telnet home page for more info

This is the first page you will see when you connect to SitePlayer Telnet's web server.

The navigation bar at the top of the web page allows you to change various SitePlayer settings:. You will find this navigation bar on all the SitePlayer pages. The various pages available are

- **Home** - returns you to the SitePlayer Telnet Setup page.
- **Services** - allows you to change the SitePlayer device name and the TCP or UDP ports that various Siteplayer services use.
- **Serial** - allows you to change serial port parameters such as baud rate and stop bits.
- **Telnet** - allows you to configure SitePlayer as a Telnet client or server and how it will connect and disconnect to remote Telnet servers.
- **IP** - allows you to enable / disable DHCP and specify additional static IP addresses.
- **Security** - allows you to change the web page username and password and limit access to SitePlayers TCP or UDP ports to certain IP addresses.
- **Reset** - allows you to restart (reboot) Siteplayer or set it back to factory defaults.
- **Update** - allows you to load new Firmware or Web pages into SitePlayer.

Each SitePlayer web page contains a footer which can be clicked to access the SitePlayer Telnet home page.

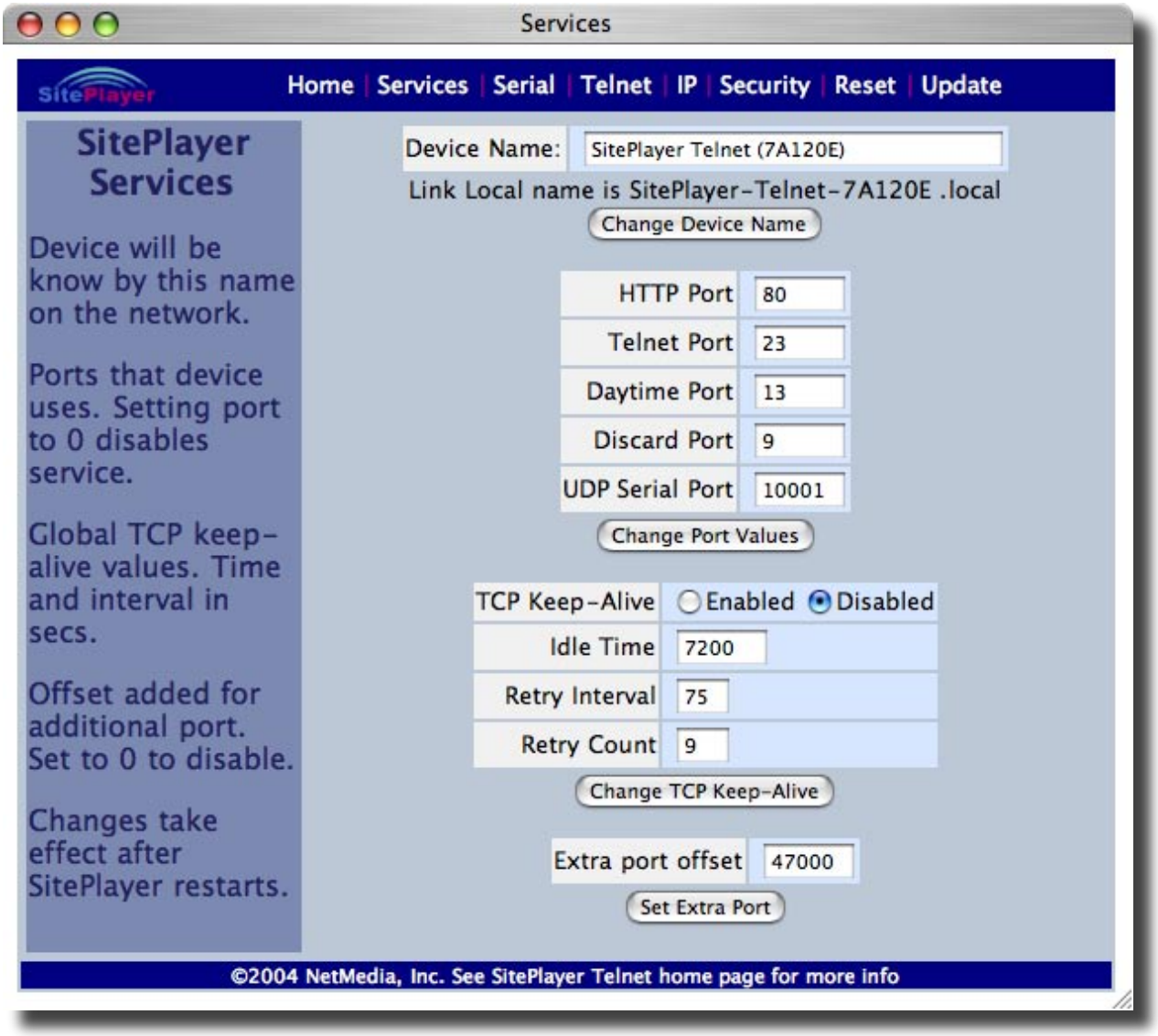
The SitePlayer Telnet Setup page gives you a quick overview of some of SitePlayer's settings:

- **Website Version** - shows the current Website version number. You can load new Website software using the Update page.
- **Firmware version** - shows the current Firmware version number. You can load new Firmware using the Update page.
- **Hardware Version** - shows the hardware version that SitePlayer is running on.
- **Ethernet MAC Address** - shows SitePlayer's Ethernet MAC address. Each SitePlayer has a unique MAC address.
- **Free Space Remaining** - shows how much free space is remaining in SitePlayers persistent (flash) storage. SitePlayer stores configuration parameters in persistent storage. If persistent storage space is exhausted, you will need to reset SitePlayer back to factory defaults to reclaim the space.

- **DHCP Address** - shows your current DHCP address. A value of 0.0.0.0 means that a DHCP address has not been obtained either due to the DHCP server not having allocated one or DHCP being disabled.
- **Link Local IP Address** - shows your current link local (LL) address. Each SitePlayer automatically generates it's own LL address which is unique on the local network. LL addresses are not routable and thus cannot be accessed outside of the local network. If you need a routable address, you should use a DHCP or Static IP address.
- **Static IP 1 & 2** - shows each static IP address that SitePlayer will respond to. A value of 0.0.0.0 means that no Static IP address has been configured.

Any changes that are made to SitePlayer parameters are saved in persistent storage. Most changes to SitePlayer parameters force SitePlayer to restart, so you should be careful not to change these parameters while there are other network connection to SitePlayer or else these connections will be lost.

# Services Web Page


Services
SitePlayer
Home | Services | Serial | Telnet | IP | Security | Reset | Update
SitePlayer Services
Device will be know by this name on the network.
Ports that device uses. Setting port to 0 disables service.
Global TCP keep-alive values. Time and interval in secs.
Offset added for additional port. Set to 0 to disable.
Changes take effect after SitePlayer restarts.
Device Name: SitePlayer Telnet (7A120E)
Link Local name is SitePlayer-Telnet-7A120E .local
Change Device Name
HTTP Port 80
Telnet Port 23
Daytime Port 13
Discard Port 9
UDP Serial Port 10001
Change Port Values
TCP Keep-Alive Enabled Disabled
Idle Time 7200
Retry Interval 75
Retry Count 9
Change TCP Keep-Alive
Extra port offset 47000
Set Extra Port
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The Services web page allows you to change the SitePlayer device name, the TCP or UDP ports that various Siteplayer services use, various TCP keep-alive parameters and an extra port offset.

## Device Name

The device name is the name that SitePlayer uses to advertise its services and is seen by the Rendezvous browser. The factory default name is in the form SitePlayer Telnet (XXXXXX), where XXXXXX is the last 3 digits of the SitePlayer's MAC address in hex. You can change the name to anything up to 32 characters. You should try to keep names unique on your network if you are using multiple SitePlayers to more easily distinguish among them.

This web page also displays the Link Local name. The link local name is a DNS safe name that is derived from the device name. Operating system which support the mDNS protocol allow you to address SitePlayer using the Link Local name.

## Port Values

You can also change the various port numbers for the protocols that SitePlayer supports. Normally you will leave these port numbers at their default values. The protocols whose port numbers you can change are

- **HTTP** - This is the http protocol which is used to communicate with SitePlayers web server.
- **Telnet** - This service is used to pass data between a network connection and the serial port.
- **Daytime** - This service is used to get the amount of elapsed time that SitePlayer has been running.
- **Discard** - This service throws away any data that is sent to it. Used mostly for speed testing.
- **UDP Serial** - This is a SitePlayer specific protocol which uses UDP to send and receive serial data.

See **SitePlayer Services and Protocols** section for more details about the protocols and how to use them.

## TCP Keep-Alive

You can enable and change various parameters which control SitePlayer's keep-alive mechanism. The keep-alive mechanism will terminate network connections if a computer is not reachable for a period of time. The parameters which can be changed here are global and effect all SitePlayer TCP/IP protocols/services (i.e. HTTP, Telnet, Daytime and Discard).

Normally TCP/IP connections are maintained indefinitely. This means that intermediate computers and routers can go down and come back up and TCP/IP will not care. This can cause problems in certain cases when a computer connected to SitePlayer goes down. SitePlayer will maintain the connection to its service for the computer because it has no way of knowing the computer has been shut down. Because a connection is still maintained for a particular service, SitePlayer will not allow other computers to connect to that service.

To remedy this problem you can enable TCP Keep-Alive. You can fine tune the keep-alive mechanism by altering various parameters

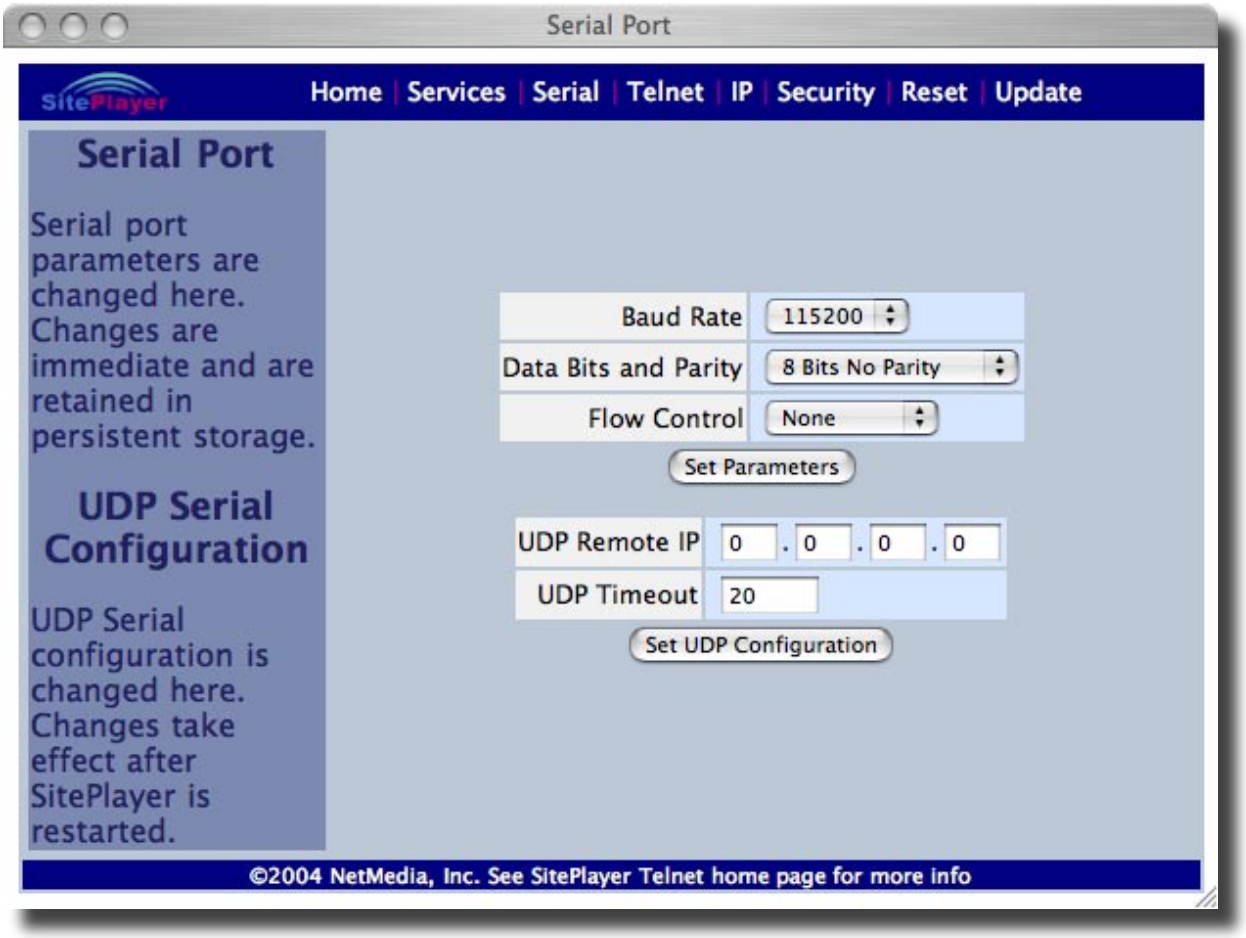
- **Idle Time** - specifies the amount of time in seconds to wait before sending a probe packet to determine if the other end is still active. The default value of 7200 is 2 hours.
- **Retry Interval** - specifies the amount of time in seconds between successive probe packets. The default is 75 seconds.
- **Retry Count** - specifies the number of times probe packets will be retried before the connection is terminated. The default value is 9 times.

## Extra Port

All SitePlayer services can be accessed at their default port numbers. The extra port value is a number which is added to the default port number which allows SitePlayer to also be accessed at different port number. For example, by default SitePlayer's web pages can be accessed at port 80. The default extra port value of 47000 allows SitePlayer to also be accessed at port 47080. If you need to disable this feature, just set the extra port value to 0.

The extra port value can be used, for example, in a NAT router to forward TCP/IP data in a certain port range to a SitePlayer. You could set port 47080 to be forwarded to a SitePlayer on the local network while the NAT router's web page was externally accessible as port 80.

# Serial Web Page


Serial Port
SitePlayer
Home | Services | Serial | Telnet | IP | Security | Reset | Update
Serial Port
Serial port parameters are changed here. Changes are immediate and are retained in persistent storage.
UDP Serial Configuration
UDP Serial configuration is changed here. Changes take effect after SitePlayer is restarted.
Baud Rate
115200
Data Bits and Parity
8 Bits No Parity
Flow Control
None
Set Parameters
UDP Remote IP
0 . 0 . 0 . 0
UDP Timeout
20
Set UDP Configuration
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The Serial web page allows you to change various parameters that deal with the serial port hardware. You can also change some parameters which deal with the UDP serial protocol here.

## Serial Port Parameters

You can change several serial port parameters. These parameters control the serial port hardware.

### Baud Rate

You can select from one of the following baud rates

- 110
- 134.5
- 150
- 300
- 600
- 1200
- 2400
- 4800
- 9600
- 19200
- 38400
- 57600
- 115200

The default baud rate is 115200.

SitePlayer will buffer data, but high data rates will cause buffer overflows. Several variables including network latency makes determining the optimal baud rate difficult. It is best to enable some kind of flow control (i.e. XON/XOFF or RTS/CTS) to ensure that the serial port buffers are not overrun.

**Data Bits and Parity**
You can set one of the following data Bits and parity combinations

- 7 Bits Even Parity
- 7 Bits Odd Parity
- 7 Bits Mark Parity
- 7 Bits Space Parity
- 8 Bits No Parity
- 8 Bits Even Parity
- 8 Bits Odd Parity
- 8 Bits Mark Parity
- 8 Bits Space Parity

The default is 8 Bits No Parity.

**Flow Control**
Flow control may be set to one of the following

- None - No flow control is performed. Data may be lost at high baud rates.
- XON/XOFF - XOFF (^S) is sent to stop data flow; XON (^Q) is sent to resume data flow
- RTS/CTS - the RTS and CTS hardware lines are used to control data flow.

In order for flow control to work properly, you must also set the device that you are connecting to SitePlayer to the same flow control settings.

Press the "Set Parameters" button to have the changes take effect immediately. SitePlayer is *not* restarted when you change serial port parameters.

## UDP Serial Configuration

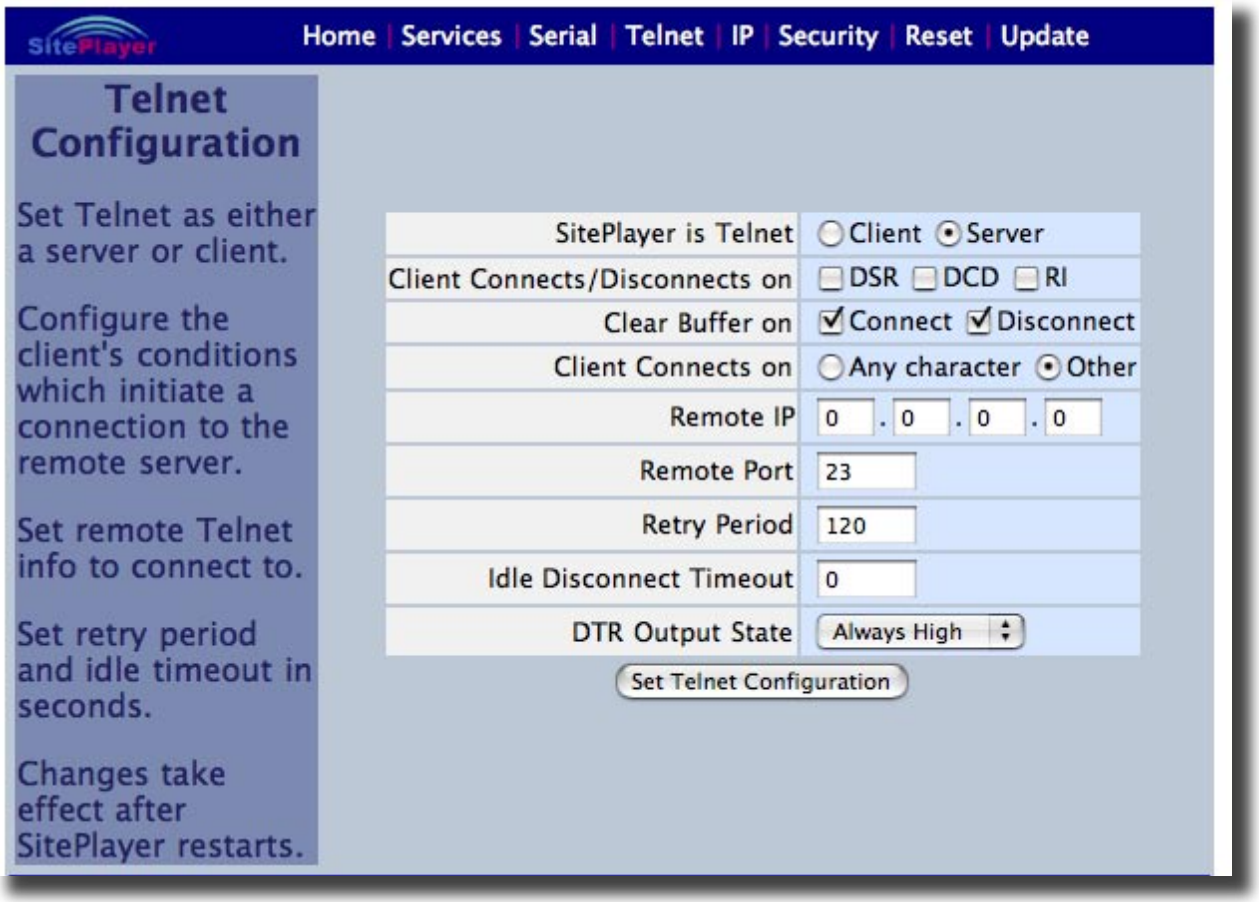
The UDP Serial configuration allows you to specify how SitePlayers UDP protocol will operate. See **SitePlayer Services and Protocols** section for more details on how to use the UDP protocol.

UDP Remote IP specifies the remote IP address that is allowed to initiate UDP data transmissions to SitePlayer. If UDP Remote IP is set to 0.0.0.0 then this means that any IP address may initiate data transmissions.

The UDP Timeout is the period measured in ticks (1 tick is 10ms). This is the time SitePlayer waits before sending any data it has in its buffer to the remote node via UDP. The internal buffer can store about 127 bytes, so UDP transmissions from SitePlayer should be kept smaller than that.

Press the "Set UDP Configuration" button to have the changes take effect and restart SitePlayer.

# Telnet Web page




The Telnet Web page allows you to control whether SitePlayer acts as a Telnet server or client. As a server, SitePlayer waits for connections to its port (default 23). As a client SitePlayer will initiate connections to other Telnet servers or TCP/IP programs. There are several parameters which allow you to specify how SitePlayer initiates connections to other Telnet servers or programs. Parameters you can select are

- **SitePlayer is Telnet** - controls whether SitePlayer is a Client or Server.
  - **Client** - SitePlayer acts as a client initiating connections based on parameters listed below.
  - **Server** - SitePlayer acts as a server passively listening for a connection to its port (default 23). You can change the default port in the Services Web page.

- **Client Connects/Disconnects on** - controls whether SitePlayer can connect on various serial port line states. SitePlayer will connect when *any* of the selected lines are high. It will disconnect when *all* the selected lines are low.
  - **DSR** - Connect on high DSR line ; disconnect on low DSR line.
  - **DCD** - Connect on high DCD line; disconnect on low DSD line.
  - **RI** - Connect on high RI line; disconnect on low RI line.

- **Clear Buffer on** - controls when and if SitePlayer should clear its serial port buffers. This affects both client and server modes.
  - **Connect** - clears serial port receive and transmit buffers before a connection is established.
  - **Disconnect** - clears serial port receive and transmit buffers after a connection is terminated.

- **Client Connects on** - controls whether a client will connect when a character is received. This does not preclude the client connecting for other conditions.
    - **Any Character** - Client connects when any character is received on the serial port.
    - **Other** - Client will not connect on a character reception, but may connect on other conditions.

- **Remote IP** - specifies the remote IP address that a Telnet client connects to. The remote address may be a connection to a Telnet server or any other TCP/IP connection including another SitePlayer running in Server mode.

- **Remote Port** - specifies the remote port number that a Telnet client connects to. The remote port may be to a Telnet server or any other TCP/IP connection including another SitePlayer running in Server mode.

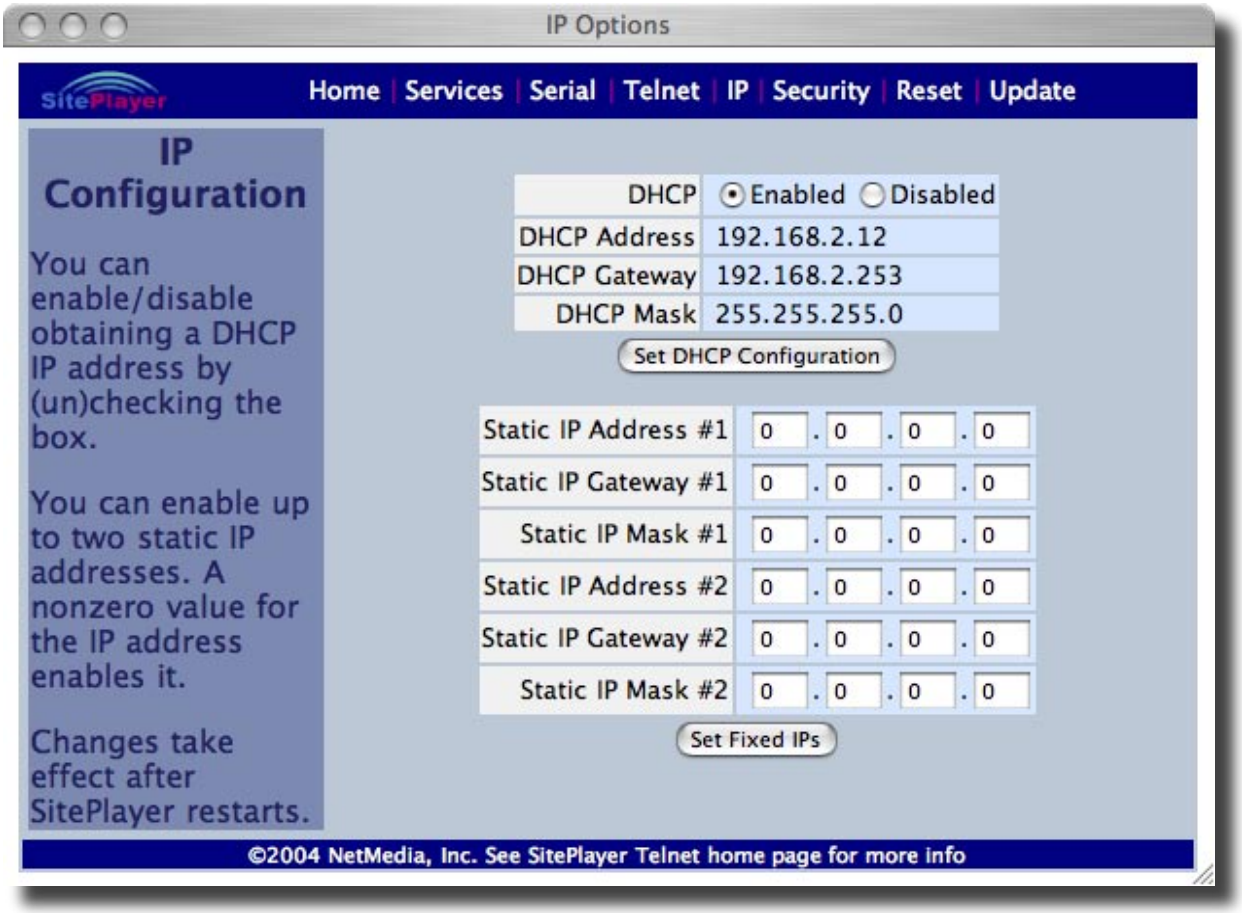
- **Retry Period** - specifies the amount of time that a Telnet client waits after a TCP disconnect or failed connection before attempting to connect again. A value of 0 causes SitePlayer to retry immediately.

- **Idle Disconnect Timeout** - specifies the amount of time in seconds to wait after no characters are received or sent before the TCP/IP connection is terminated. The idle disconnect timeout may be used in both Client and Server modes. An Idle Disconnect Timeout of 0 disables the feature.

- **DTR Output State** - specifies what state the DTR line output will be in and how Telnet will control it. This can be useful when you have a microprocessor or other device which needs to know if a connection has been established. The DTR line may briefly fluctuate when SitePlayer is first started or after a reset. Your attached device will need to wait a few seconds after power is applied or after SitePlayer is reset before reading the DTR line.
    - **Always High** - DTR line will always be high (default).
    - **Always Low** - DTR line will always be low.
    - **Connect High** - DTR line will be high when SitePlayer has an established connection on its Telnet port. This applies to both client and server modes. The DTR line will be low when the connection is terminated.
    - **Connect Low** - DTR line will be low when SitePlayer has an established connection on its Telnet port. This applies to both client and server modes. The DTR line will be high when the connection is terminated.

SitePlayer polls every second for various conditions to change. The above input parameters may take up to one second before they are noticed. This means, for example, the changes in the serial port line states may take up to a second before they are detected. The serial hardware lines should, therefore, be kept constant for at least one second.

# IP Web Page


IP Options
SitePlayer
Home | Services | Serial | Telnet | IP | Security | Reset | Update
IP Configuration
You can enable/disable obtaining a DHCP IP address by (un)checking the box.
You can enable up to two static IP addresses. A nonzero value for the IP address enables it.
Changes take effect after SitePlayer restarts.
DHCP Enabled Disabled
DHCP Address 192.168.2.12
DHCP Gateway 192.168.2.253
DHCP Mask 255.255.255.0
Set DHCP Configuration
Static IP Address #1 0 . 0 . 0 . 0
Static IP Gateway #1 0 . 0 . 0 . 0
Static IP Mask #1 0 . 0 . 0 . 0
Static IP Address #2 0 . 0 . 0 . 0
Static IP Gateway #2 0 . 0 . 0 . 0
Static IP Mask #2 0 . 0 . 0 . 0
Set Fixed IPs
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The IP Web page allows you to specify how SitePlayer acquires an IP address. You can enable or disable DHCP address acquisition or you can assign fixed IP addresses to SitePlayer.

## DHCP Configuration

The current DHCP status is displayed along with the DHCP address, gateway and mask that has been acquired. The only option you have is to enable or disable DHCP address acquisition.

## Fixed IP Addresses

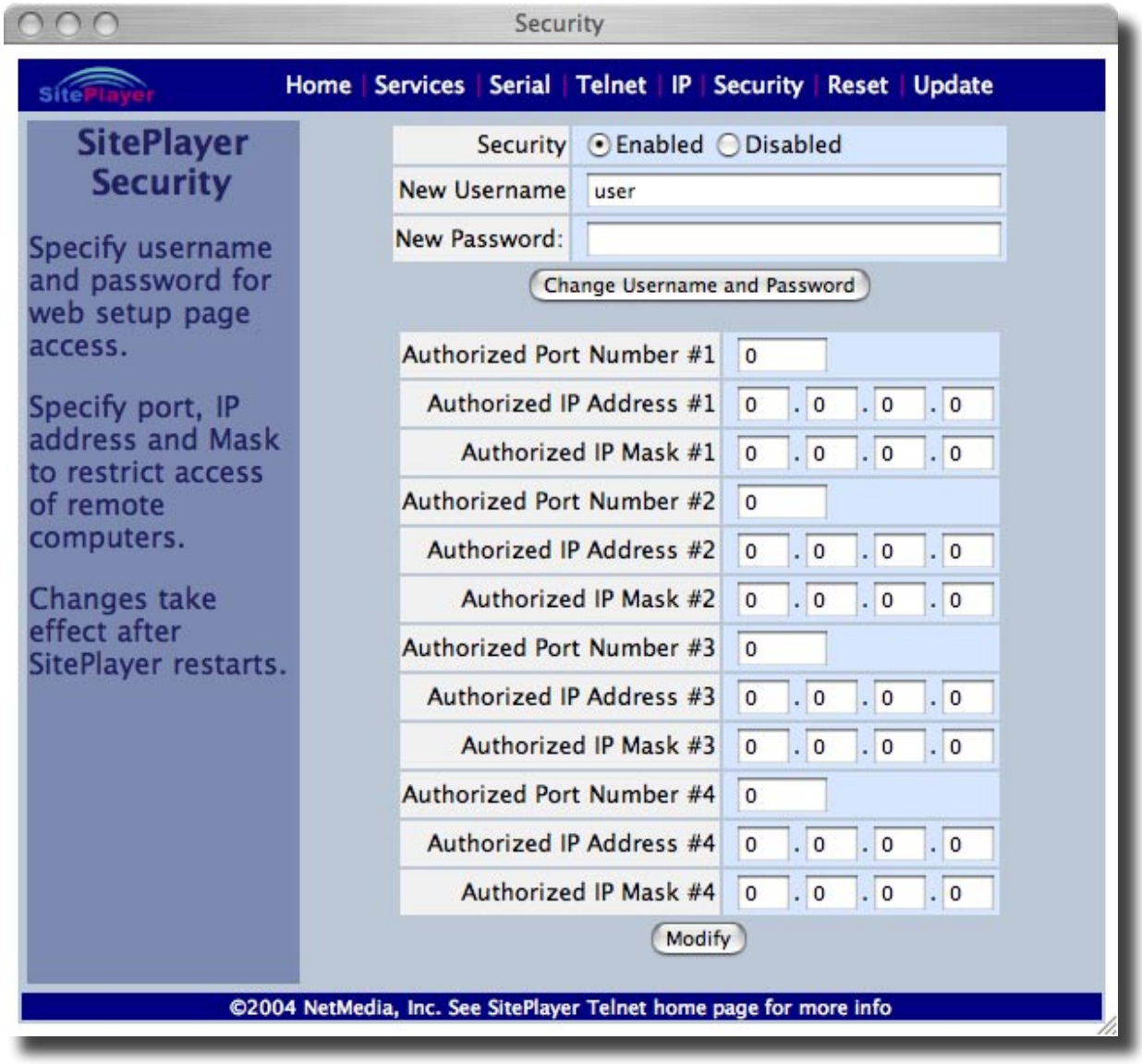
You can specify up to 2 static IP addresses. Static IP addresses can be used to give SitePlayer a known unchanging IP address. You will need to specify the IP address, gateway, and mask to properly set the static IP address. The gateway and mask values are used to initiate communications from SitePlayer to other computers. Some example values are

| | |
|---|---|
| Static IP Address #1 | 192.168.1.50 |
| Static IP Gateway #1 | 192.168.1.254 |
| Static IP Mask #1 | 255.255.255.0 |

If you disable DHCP address acquisition and you don't specify any static IP addresses, the only IP address that SitePlayer will have is the automatically generated Link Local address. This may make SitePlayer more difficult to locate on a network if your computer does not support link local addressing. See **Appendix B - Adding Route to Windows so Link Local Devices Can be Accessed** if you have Windows and need to only use a link local address.

In order to have changes to the DHCP configuration or static IP addresses made, SitePlayer will automatically restart.

# Security Web Page


Security
SitePlayer
Home | Services | Serial | Telnet | IP | Security | Reset | Update
SitePlayer Security
Specify username and password for web setup page access.
Specify port, IP address and Mask to restrict access of remote computers.
Changes take effect after SitePlayer restarts.
Security Enabled Disabled
New Username user
New Password:
Change Username and Password
Authorized Port Number #1 0
Authorized IP Address #1 0 . 0 . 0 . 0
Authorized IP Mask #1 0 . 0 . 0 . 0
Authorized Port Number #2 0
Authorized IP Address #2 0 . 0 . 0 . 0
Authorized IP Mask #2 0 . 0 . 0 . 0
Authorized Port Number #3 0
Authorized IP Address #3 0 . 0 . 0 . 0
Authorized IP Mask #3 0 . 0 . 0 . 0
Authorized Port Number #4 0
Authorized IP Address #4 0 . 0 . 0 . 0
Authorized IP Mask #4 0 . 0 . 0 . 0
Modify
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The Security Web page allows you to specify the level of protection you need for SitePlayer.

## Change Username and Password

You can enable or disable username and password protection for SitePlayer's web pages. If you disable username/password security anyone can access SitePlayer's web setup pages. With security enabled all of SitePlayer's web setup pages will be protected with a username and password, although you will only need to enter this information once when you access the web page.

You can change the username and password for web access. Both the username and password are case sensitive. Only the username is displayed. The default username and password are

| | |
|---|---|
| Default username | ***user*** |
| Default password | ***password*** |

If you forget the username/password you will need to perform a hardware reset to set SitePlayer to its default username and password.

## Authorized Port, IP address and Mask

You can specify up to 4 TCP ports that you need to be protected. You can protect ports so that only computers with certain IP addresses can have access to SitePlayer. You need to set three parameters for each port that needs to be protected:

- **Port Number** - the number of the port you wish to have protected. These port numbers should correspond to the port numbers in the Services web page. For example, the factory default port of 80 is used for HTTP. Access is only restricted for port numbers which are listed here. If a port number is not listed then it has no access restriction.
- **IP Address** - the complete or partial IP address that will have access to the port.
- **IP Mask** - a mask value which allows you to specify a range of IP addresses. The mask is ANDed with the IP address which is accessing SitePlayer and compared to the **IP Address** above.

Here are some examples,

| | |
|---|---|
| Port Number | 80 |
| IP Address | 192.168.2.0 |
| IP Mask | 255.255.255.0 |

This will grant access to port 80 (the HTTP port) for anyone from the 192.168.2.0 subnet. That is IP addresses 192.168.2.0 to 192.168.2.255.

| | |
|---|---|
| Port Number | 23 |
| IP Address | 192.168.2.153 |
| IP Mask | 255.255.255.255 |

This will grant access to port 23 (the Telnet port) for anyone from IP address 192.168.2.153. Notice by setting the mask to 255.255.255.255 and specifying a full Ip address, you can restrict access to just a single IP address.

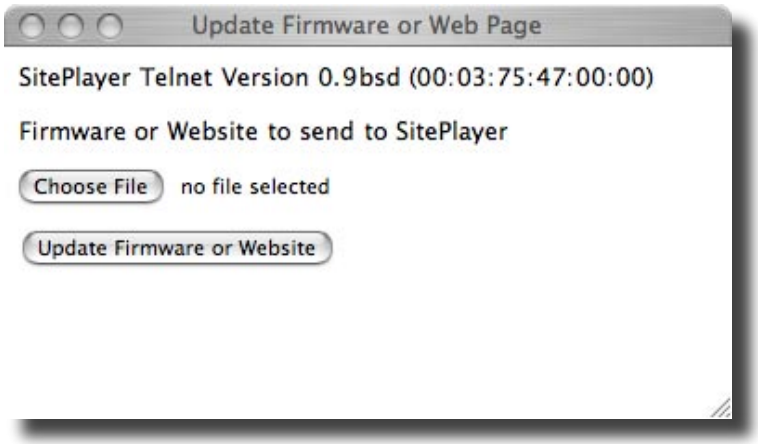
# Reset Web Page

Reset
SitePlayer
Home | Services | Serial | Telnet | IP | Security | Reset | Update
Reset SitePlayer
Restart SitePlayer applies changes you have made.
Factory Defaults sets SitePlayer to its factory state.
Restart SitePlayer
Set to Factory Defaults
©2004 NetMedia, Inc. See SitePlayer Telnet home page for more info

The Reset Web page allows you to force Siteplayer to restart (reboot) or to have SitePlayer set itself into a factory default configuration.

Press the "Restart SitePlayer" button to force Siteplayer to restart itself. Any active network connections will be lost when SitePlayer restarts.

Press "Set to Factory Defaults" to cause SitePlayer to erase its persistent storage. SitePlayer will revert to a factory default configuration. The current Website will be erased, but the current Firmware will not be altered. This operation will take about 1 minute. During this time, SitePlayer's LED will be blinking indicating that the persistent storage is being erased. Do not remove power while this is happening. After the persistent storage is erased, SitePlayer will restart and revert to a minimal web page:


Update Firmware or Web Page
SitePlayer Telnet Version 0.9bsd (00:03:75:47:00:00)
Firmware or Website to send to SitePlayer
Choose File
no file selected
Update Firmware or Website

You should reload the WebSite ROM file so that you can reconfigure SitePlayer. See the **Update Web Page** section on how to reload the WebSite ROM file.

# Update Web Page

Update Firmware
SitePlayer
Home | Services | Serial | Telnet | IP | Security | Reset | Update
Update Firmware
Select the firmware or website update-file you wish to send to SitePlayer.
Current Firmware version is0.9btv
Current Website version is 0.9adz
Update-file to send to SitePlayer
Choose File
no file selected
Update SitePlayer
©2004 NetMedia, Inc. See SitePlayer Telnet home page for more info

The Update web page allows you to load new Firmware or WebSite ROM software. You will do this when new software becomes available. You can also do this to reload the current software. SitePlayer determines from the contents of the file you select which kind of software is being loaded. The currently loaded Firmware or WebSite version is displayed for reference purposes.

The Update web page will appear slightly different depending on which browser you use. For example, if you are using Internet Explorer, the web page will look like this

SitePlayer
Home | Services | Serial | IP | Security | Reset | Update
Update Firmware
Select the firmware or website update-file you wish to send to SitePlayer.
Current Firmware version is 0.9bsd
Current Website version is 0.9adc
Update-file to send to SitePlayer
Browse...
Update SitePlayer

In either case you will need to press the "Browse..." or "Choose File" button to select the appropriate file. ROM files are named as follows

SPT_Firmware_V***n_naaa***.rom
SPT_Website_V***n_naaa***.rom

where ***n_naaa*** is the version number which corresponds to version ***n.naaa*** of the ROM file.

# SitePlayer Services and Protocols

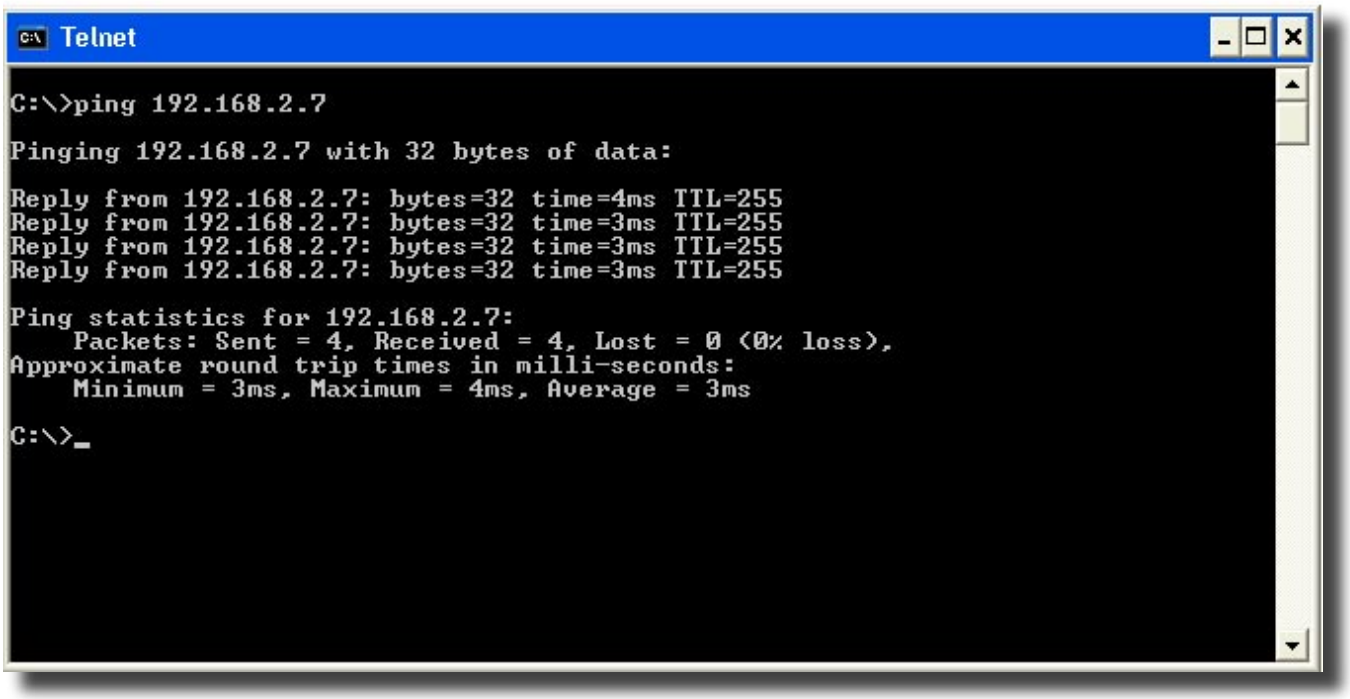
SitePlayer Telnet supports a variety of internet protocols and services.

## Address Resolution Protocol ARP

SitePlayer uses ARP to convert a remote IP address to a MAC address so it can send packets directly to the remote device.

## PING

SitePlayer will also respond to ping request. You can check that SitePlayer is connected to the network by pinging its IP address. Most operating systems have a ***ping*** command. For Windows you can issue the command at the DOS prompt of COMMAND.COM. Under Mac OS X, you issue the command in a terminal window. In Unix you can issue the command in any shell. Here is a sample output from a ***ping*** command under Windows:


Telnet
C:\>ping 192.168.2.7
Pinging 192.168.2.7 with 32 bytes of data:
Reply from 192.168.2.7: bytes=32 time=4ms TTL=255
Reply from 192.168.2.7: bytes=32 time=3ms TTL=255
Reply from 192.168.2.7: bytes=32 time=3ms TTL=255
Reply from 192.168.2.7: bytes=32 time=3ms TTL=255
Ping statistics for 192.168.2.7:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 3ms, Maximum = 4ms, Average = 3ms
C:\>

## Zero Configuration (ZeroConf) Link Local (LL) Address Acquisition

SitePlayer conforms to the IETF draft with specifies how a host may automatically configure an interface with an IPv4 address within the 169.254/16 prefix. This means that SitePlayer can automatically configure itself with a unique IP address. This IP address, however, is only usable on the local link, which means that it is not routable outside the local link. So a SitePlayer using only a Link Local address can only communicate with devices which are on the same physical network. If you need SitePlayer to access or be accessed by devices outside of the local network, you will need to make sure DHCP is enabled or assign SitePlayer a unique static IP address

## Multicast DNS (mDNS)

SitePlayer conforms to the IETF draft cheshire-dnsext-multicastdns-04 which states

> "Multicast DNS (mDNS) provides the ability to do DNS-like operations on the local link in the absence of any conventional unicast DNS server. In addition, mDNS designates a portion of the DNS name-space to be free for local use, without the need to pay any annual fee, and without the need to set up delegations or otherwise configure a conventional DNS server to answer for those names. The primary benefits of mDNS names are that (i) they require little or no administration or configuration to set them up, (ii) they work when no infrastructure is present, and (iii) they work during infrastructure failures."

SitePlayer uses mDNS to advertise its name and the services it has available.

## Rendezvous

The combination of ZeroConf LL and mDNS allows SitePlayer services to be browsable by Rendezvous browsers. Rendezvous is an Apple trademark which

> "enables automatic discovery of computers, devices, and services on IP networks. Also known as Zero Configuration networking, Rendezvous uses industry standard IP protocols to allow devices to automatically find each other without the need to enter IP addresses or configure DNS servers. Rendezvous is an open protocol, which Apple has submitted to the IETF as part of the ongoing standards-creation process."

## Dynamic Host Configuration Protocol (DHCP)

SitePlayer uses DHCP in the presence of a DHCP server to configure its IP address, gateway and network mask.

## Transmission Control Protocol / Internet Protocol (TCP/IP)

TCP/IP is the core communications protocol that SitePlayer uses to communicate reliably on the network.

## User Datagram Protocol (UDP)

UDP is used by such things as mDNS and the SitePlayer UDP serial protocol. UDP is not a reliable protocol and thus data sent with UDP is not guaranteed to arrive at its destination. If you use UDP to communicate with SitePlayer, you will need to take this into account.

## Hypertext Transfer Protocol (HTTP)

HTTP is the web protocol which is used to communicate with SitePlayer's web server. SitePlayer's web server is primarily used to display and set SitePlayer's configuration.

## Telnet

This service is used to pass data between a network connection and SitePlayer's serial port. The default TCP/IP port for Telnet is 23. The easiest way to attach to SitePlayer's serial port is to issue a telnet command. For example,

```
telnet 192.168.2.7
```

Characters typed into the Telnet program are sent to SitePlayer. Characters that SitePlayer receives are sent to the Telnet program.

SitePlayer currently only operates in binary mode. This means that it passes all characters unchanged back and forth through the Telnet port.

## Daytime

This service is used to get the elapsed time that SitePlayer has been running. To get the elapsed time, you need to open a TCP/IP connection to SitePlayer on port 13 and read the data from that port. The easiest way to do this is to run the **telnet** program with port 13. For example,

```
telnet 192.168.2.7 13
```

## Discard

This service throws away any TCP/IP data that is sent to it. This is used mostly for speed testing. The default port for discard is 9.

## UDP Serial (UDPS)

This is a SitePlayer specific protocol which uses UDP to send and receive serial data. UDPS is a specialized protocol. Data that is received by SitePlayer's serial port is transmitted using UDP and the default port of 10001. SitePlayer can be configured to either accept UDPS data from only a specific computer or the first computer that sends it UDPS data. If configured for a specific computer, SitePlayer can send data at any time to that computer. If configured for the first computer that sends it data, then SitePlayer has to wait to receive data so it can determine the response IP address.

UDPS is useful in a polling environment where a master computer polls multiple slaves for data. The master computer would send a data packet which elicits a response from the device attached to SitePlayer. The data would then be sent to the master computer.

# Informative and Error Messages

You will encounter several informative and error messages as you use SitePlayer's setup web pages. These messages will appear after you have clicked on a form button on a web page. The message are

### Factory defaults are being set. Please wait...

You have requested that the SitePlayer is set back to its factory default state. Persistent storage is being cleared. This operation will take about a minute.

### Parameters set OK

You have requested changing some parameters that did not require restarting SitePlayer. For example, changing serial port parameters will give this message.

### Restarting. Please wait...

You have requested to change some SitePlayer parameters that has resulted in SitePlayer restarting. Most parameters that are changed in SitePlayer require a restart. You will also get this message if you clicked on "Reset" in the Reset web page.

### Bad flash file.

The flash file you attempted to update SitePlayer with was either corrupt or some kind of network error caused the file to be received incorrectly. Make sure you are sending a valid flash file to SitePlayer. If you have verified that the flash file sent to SitePlayer is valid, then try updating SitePlayer again with the same file. You may also get this message if your web browser does not correctly upload files. You could try switching to a different browser.

### Bad request from browser or file not found.

You have requested a page on the SitePlayer that does not exist or your browser has sent a command that SitePlayer does not recognize.

### Error setting parameters

There was an error in setting the parameters. Try the command again. You may also get this error if SitePlayer's persistent storage is full.

### Firmware received OK. Reflashing, please wait...

SitePlayer has determined that you are attempting to upload a firmware file and that it was received with no errors. SitePlayer will now reflash it's persistent storage with a copy of the newly received firmware. This operation will take several minutes.

### Website feature/version mismatch

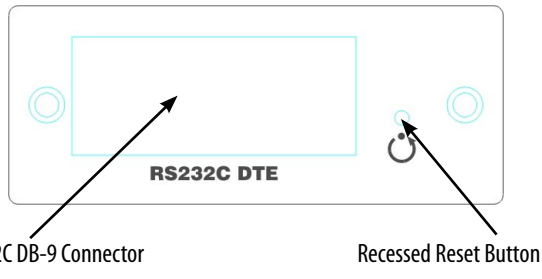
The website you uploaded to SitePlayer is not compatible with the firmware currently running in SitePlayer. This error is usually caused by attempting to load a website version into SitePlayer that is either too old or too new. SitePlayer's firmware is feature locked with certain website versions. If you attempt to load a website which does not have a compatible feature set, then you will get this error message.

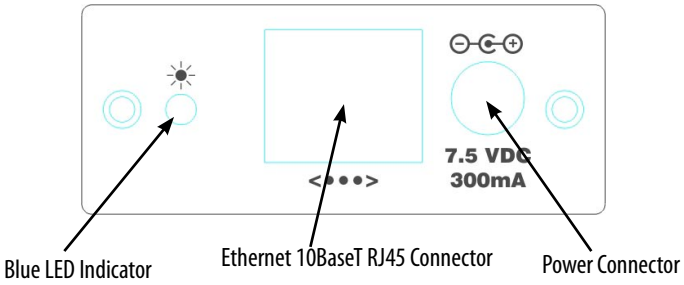
### Website received OK. Restarting...

SitePlayer has determined that you are attempting to upload a website file and that it was received with no errors. SitePlayer will now reflash it's persistent storage with a copy of the newly received firmware. This operation will take several minutes.

# End Plate Description

The SitePlayer Telnet box has two end plates which contain three connectors, an LED indicator and a reset button.

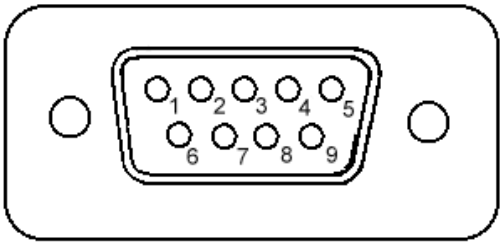



The DB-9 Connector is a male RS232C DTE connector. This means that it is electrically identical to a PC serial port connector. The signals available on the connector are

| Pin | Name | Direction |
|---|---|---|
| 1 | DCD | → |
| 2 | RX | → |
| 3 | TX | ← |
| 4 | DTR | ← |
| 5 | GND | |
| 6 | DSR | → |
| 7 | RTS | ← |
| 8 | CTS | → |
| 9 | RI | → |

| | |
|---|---|
| To SitePlayer | → |
| From SitePlayer | ← |




The Recessed Reset Button is used to reset SitePlayer to its factory default state. See the **Performing Hardware Reset to Set SitePlayer to Factory Defaults** section on how to operate the button.

The Blue LED Indicator has multiple functions

- During normal operation it indicates that the link is active. It stays constantly lit on an active link.
- When SitePlayer is being reprogrammed the LED will flash indicate that the internal flash is being erased and reprogrammed. This will happen when new Firmware or Website is software is loaded or when the hardware reset button is pressed.

The Ethernet 10BaseT RJ45 Connector is used to connect to the Ethernet network.

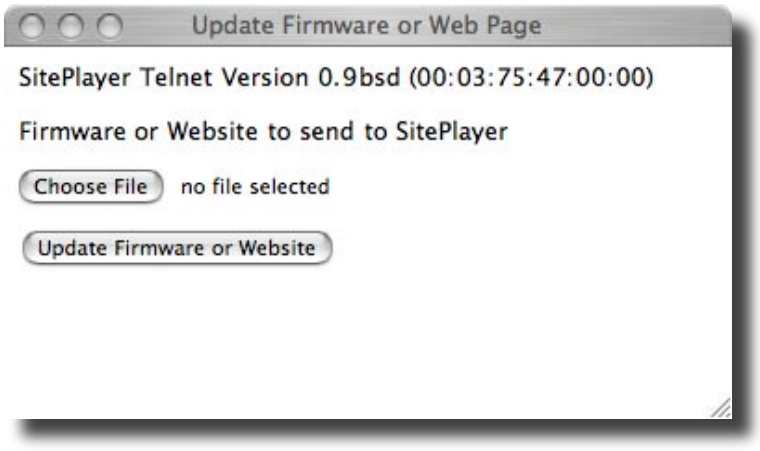
The Power Connector supplies 7.5VDC to power SitePlayer. The power connector label states 300ma. This is the maximum power that SitePlayer is rated for, although it typically consumes less than 150ma.

# Performing Hardware Reset to Set SitePlayer to Factory Defaults

If for some reason SitePlayer needs to be reset to its factory default state and you cannot access the SitePlayer web page to perform this, you can use the recessed reset button located to the right of the DB-9 connector. Resetting SitePlayer to its factory defaults erases its web page and clears out the persistent storage. Resetting to factory defaults will not change the firmware version loaded into SitePlayer.

To perform a hardware reset, remove the power connector and insert a paper clip into the recessed reset hole. You will feel the reset button depress. With the reset button still depressed, plug the power connector back in. The blue LED will start blinking for a while. While the LED is blinking, do not remove power to SitePlayer. The reset process is complete when the LED stops blinking. The LED will either be lit constantly if SitePlayer is plugged into an active network, or the LED will be off.

All your configuration settings are now erased. The factory WebSite is also erased and a minimal website is present. When you connect to SitePlayer you will see a web page that looks like this:


Update Firmware or Web Page
SitePlayer Telnet Version 0.9bsd (00:03:75:47:00:00)
Firmware or Website to send to SitePlayer
Choose File
no file selected
Update Firmware or Website

You will need to reload the WebSite ROM file. See the Update Web Page section for information regarding this.

# Appendix A
# Installing a Zeroconf / Rendezvous Browser Under Windows

Although there is nothing currently built into Windows to support browsing for Rendezvous services, there are several programs available free of charge.

The easiest to use and install is "Rendezvous Browser" which is written by Apple. The software is open-source and freely available. An executable version of the program can be found at

http://www.SitePlayer.com/telnet/

If you are running Windows 2000 or Windows XP then you can download Porchdog Software's Howl. Howl is open-source and royalty-free and installs a plug-in into Internet Explorer (IE) which allows you to browse for Rendezvous services via IE. See

http://www.porchdogsoft.com/products/howl/

Howl is available for Windows 2000/XP, Linux, FreeBSD and Mac OS X. Although you will not need to install it under Mac OS X since Rendezvous browsing is supported with the Safari web browser.

Another product which lets you browse for Rendezvous services is Jmdns. This is a Java program and requires that you have a Java virtual machine installed. This may be the only route available if you have Windows 95/98/NT or an operating system that the above programs don't support. See

http://sourceforge.net/projects/jmdns/

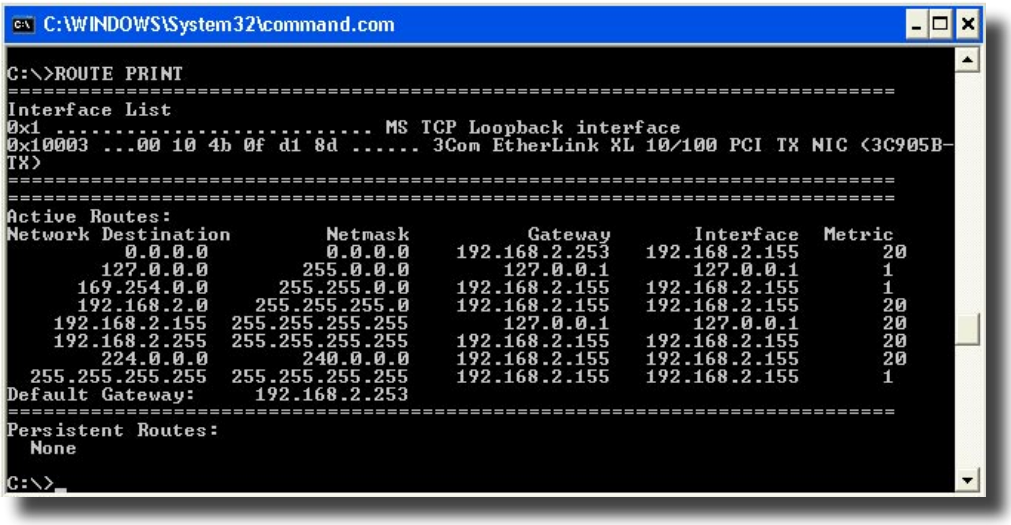
Jmdns is also open-source and royalty-free.

# Adding Route to Windows so Link Local Devices Can be Accessed

Windows supports Link Local (LL) addressing. If you are connected to a network and an IP address cannot be obtained manually or automatically (via DHCP), Windows will choose a LL address. These addresses are in the form 169.254.x.y, where x.y are randomly chosen numbers such that they are unique on the network. While Windows is using the LL address it maintains a route to the LL address subnet. This means that it can communicate with LL devices such as SitePlayer.

In most cases once Windows obtains an IP address via DHCP, SitePlayer will also obtain a DHCP address and accessing the device is not an issue. There may be cases, however, where the DHCP server does not assign an IP address to SitePlayer. This can occur when DHCP has been disabled in SitePlayer or the DHCP server's IP address allocation rules prevent an address from being assigned. In these cases, SitePlayer can only be accessed via it's LL address.

Unfortunately, once Windows obtains a non LL address (either manually or through DHCP), it removes its route to the LL address subnet. This has the effect of not being able to communicate with devices which are addressed only through 169.254.x.y. The easiest way around this is to add a route to the LL subnet so that Windows knows where to send packets that are addressed to LL devices. This may be accomplished by running COMMAND.COM and typing ROUTE PRINT




You will need the interface IP address under the "Interface" column before the "Default Gateway" line. In this example it is ***192.168.2.155***.

Type the following command substituting your interface IP address for ***192.168.2.155***:

**ROUTE ADD 169.254.0.0 MASK 255.255.0.0** ***192.168.2.155***

This will add a route so that link local devices can be accessed. You will need to do this every time the computer is rebooted, unless you make the route permanent by typing

**ROUTE -p ADD 169.254.0.0 MASK 255.255.0.0** ***192.168.2.155***

# TCP/IP Tuning Considerations

There are many ways in which TCP/IP implementations may be tuned. Some tuning may improve performance. Due to the design of SitePlayer and its small serial port buffers, some communications to other TCP/IP machines may not be as optimal as can be. In particular a feature of TCP/IP called *Delayed ACKs* will cause performance decreases in communications between SitePlayer and certain computers. By reducing or disabling delayed ACKs, you can get a substantial throughput improvement. Various operating systems control delayed ACKs differently. Here is how you can turn off (or reduce) delayed ACKs for the most popular operating systems.

## Windows

Delayed ACKs can be reduced in Windows through a registry change. Normally an ACK is sent for every other TCP segment received on a connection, unless the delayed ACK timer (200 milliseconds) expires. The delayed ACK timer for each interface can be adjusted by setting the value of the TCPDelAckTicks registry entry (HKLM\SYSTEM\CurrentControlSet\Services\Tcpip\Parameters\Interfaces\<interface>). Changing the value to 20ms will substantially improve performance.

If you are writing your own programs, you can turn off ACK delays at the socket level rather than for the whole system. Use setsockopt with the TCP_NODELAY option. For more information regarding tuning Windows 2000/XP see

http://www.microsoft.com/technet/itsolutions/network/deploy/depovg/tcpip2k.mspx

## Mac OS X or FreeBSD

Under Mac OS X or FreeBSD you can modify the delayed ACK time via the sysctl command. To see what sysctl parameters may be modified you can type

**sysctl -A**

You can display the value of a particular sysctl parameter by typing

**sysctl -A *parameter***

The parameters which are of interest for delayed ACKs are ***net.inet.tcp.delacktime*** and ***net.inet.tcp.delayed_ack*.** In some implementations ***net.inet.tcp.delacktime*** does not work, so you can turn ACK delays off completely with ***net.inet.tcp.delayed_ack***:

**sudo sysctl -w *net.inet.tcp.delayed_ack=0***

This is not the most ideal solution, but it does work. If you are writing your own programs, you can turn off ACK delays at the socket level rather than for the whole system. Use setsockopt with the TCP_NODELAY option.

## Linux

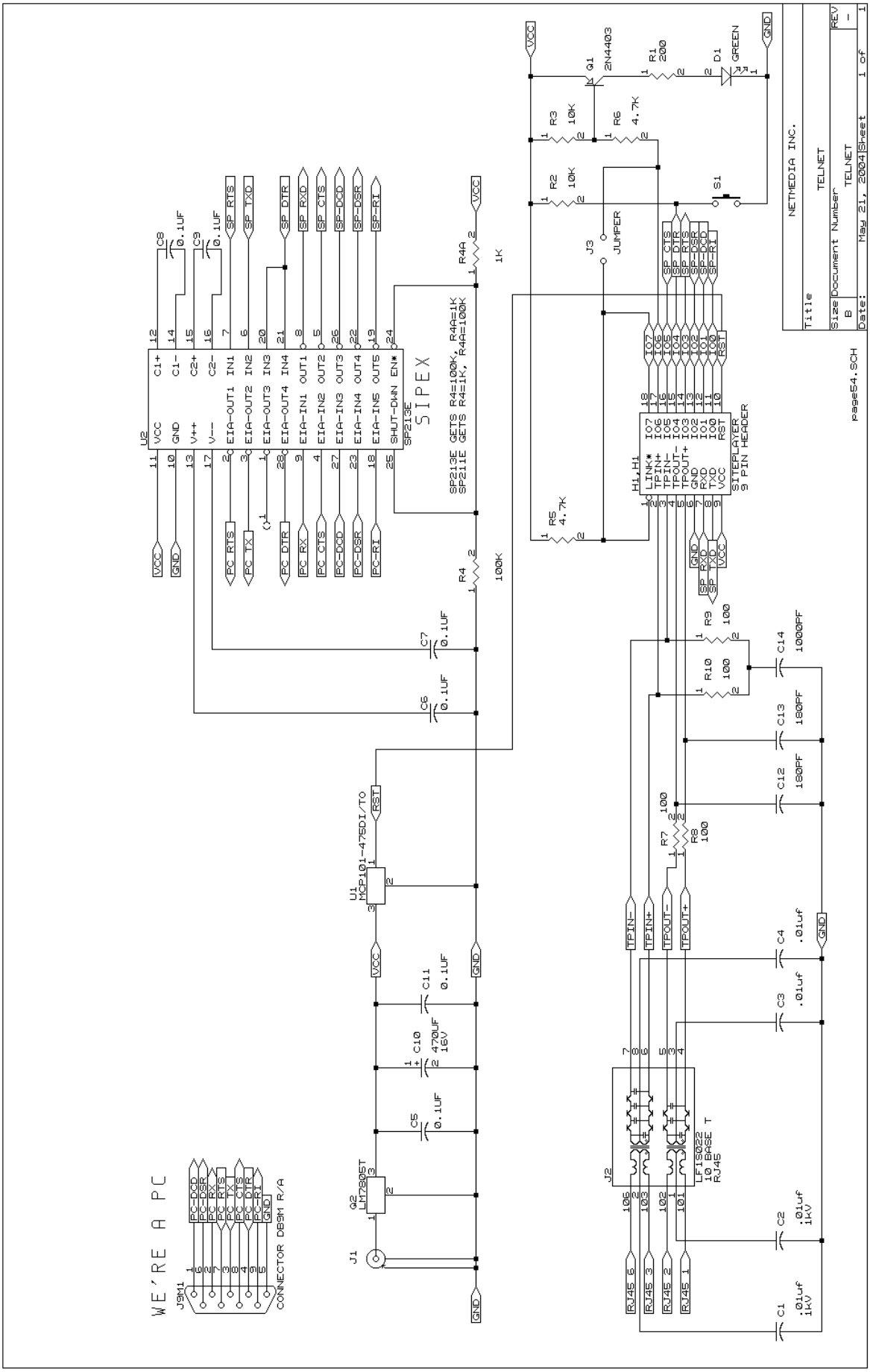
You cannot disable or change the delayed ACK time via sysctl, but Linux's implementation of delayed ACKs is very adaptive and results in a minimal performance loss. If you are writing your own programs, you can turn off ACK delays at the socket level. Use setsockopt with the TCP_NODELAY or TCP_QUICKACK option.

# Appendix B
# DB-9 Null Modem Cable Wiring

If you need to connect SitePlayer Telnet to another DCE device such as a PC Serial port, you will need to connect it using a null modem cable. A null modem cable switches the data lines and other control lines around. The following table illustrates how to wire a proper DB-9 Null modem cable:

| Side A | | Side B | |
|---|---|---|---|
| **Signal** | **Pin** | **Pin** | **Signal** |
| DCD<br>DSR | 1<br>6 | 4 | DTR |
| RX | 2 | 3 | TX |
| TX | 3 | 2 | RX |
| DTR | 4 | 1<br>6 | DCD<br>DSR |
| GND | 5 | 5 | GND |
| RTS | 7 | 8 | CTS |
| CTS | 8 | 7 | RTS |

# Telnet Carrier Schematic



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